IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :

YASUO OHBA : EXAMINER: MONDT, J.P.

SERIAL NO: 10/773,297 :

FILED: FEBRUARY 9, 2004 : GROUP ART UNIT: 2826

FOR: NITRIDE COMPOUND :

SEMICONDUCTOR ELEMENT

SECOND DECLARATION UNDER 37 C.F.R. §1.132

COMMISSIONER FOR PATENTS

ALEXANDRIA, VIRGINIA 22313-1450

SIR:

I; Yasuo OHBA, a citizen of Japan, hereby declare and state that:

1. I have Doctor of Engineering degree, which was conferred upon me in 1983 by the Tokyo Institute of Technology located in 4259 Nagatsuta-cho, Midori-ku, Yokohama, 226-8503, JAPAN.

2. I have been employed by Toshiba Corp. since 1983 and I have a total of 19 years of work and research experience in the field of crystal growth of compound semiconductors.

3. The following experiments were carried out by me or under my direct control.

4. As described in the Declaration Under 37 C.F.R. § 1.132 filed January 8, 2004, in parent U.S. Application No. 10/188,744, and in the specification of the above-identified application at page 10, line 26 to page 11, line 22, nitride compound semiconductor elements of the structure shown in FIG. 2 were made by sequentially depositing on a sapphire substrate 1 a first single crystalline layer 2 of AlN, a second single crystalline layer 3 of $Al_xGa_{1-x}N$, and other layers 4-18 of a nitride compound semiconductor.

The density of cracks in the active layers of the device structure was monitored as a function of the Al mole fraction x of the second single crystalline layer 3 of $Al_xGa_{1-x}N$. The results are plotted in the attached FIG. B; which corresponds to FIG. 3 of the above-identified application and to the attached FIG. A of the Declaration Under 37 C.F.R. § 1.132 filed January 8, 2004, in parent U.S. Application No. 10/188,744. FIGS. A and B show crack density when Al mole fraction x = 0.8, 0.95 and 0.98. FIG. B also shows crack density when Al mole fraction x = 0.72. The data for the Al mole fraction x = 0.72 in FIG. B was not included in FIG. A because the crack density exceeds 100 and is off the ordinate scale of FIG. A.

FIGS. A and B show that when the Al mole fraction x is less than 0.85 or more than 0.95 the crack density increases significantly.

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5. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

6. Further deponent saith not.

Date: April 6, 2004   *Yasuo Ohba*

                                                    Yasuo OHBA

Attachments:
FIG. A
FIG. B